

AA2017-6

AIRCRAFT ACCIDENT INVESTIGATION REPORT

**Japan Airlines Co., Ltd.
J A 6 5 8 J**

September 28, 2017



The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board and with Annex 13 to the Convention on International Civil Aviation is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Kazuhiro Nakahashi

Chairman

Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

AIRCRAFT ACCIDENT INVESTIGATION REPORT

JAPAN AIRLINES CO., LTD.
BOEING 767-300, JA658J
CABIN ATTENDANT INJURY
BY THE SHAKING OF THE AIRCRAFT
ABOUT 21 NM (ABOUT 39 KM) EAST-SOUTHEAST
OF KAGOSHIMA AIRPORT
AT AN ALTITUDE OF ABOUT 17,000 FT (ABOUT 5,200 M),
AT ABOUT 13:21 JST, NOVEMBER 10, 2016

August 28, 2017

Adopted by the Japan Transport Safety Board

Chairman Kazuhiro Nakahashi
Member Toru Miyashita
Member Toshiyuki Ishikawa
Member Yuichi Marui
Member Keiji Tanaka
Member Miwa Nakanishi

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident	<p>On Thursday, November 10, 2016, a Boeing 767-300, registered JA658J, operated by Japan Airlines Co., Ltd., had one cabin attendant fell and injured during a takeoff climb for a flight from Kagoshima Airport to Tokyo International Airport with 129 persons on board, consisting of 11 crew members and 118 passengers.</p>
1.2 Outline of the Accident Information	<p>On November 11, 2016, the Japan Transport Safety Board (JSTB) designated an investigator-in-charge and an investigator to investigate this accident.</p> <p>An accredited representative of United States of America, as the State of Manufacture and Design of the Aircraft involved in this accident participated in the investigation.</p> <p>Comments were invited from parties relevant to the cause of the accident and the relevant State.</p>

2. FACTUAL INFORMATION

2.1 History of the Flight	<p>According to the statements of the pilot in command (hereinafter refer to as “the PIC”), the first officer (hereinafter referred to as “the FO”) and the cabin attendant (hereinafter referred to as “the CA”) as well as records of a flight data recorder, the history of the flight is summarized as follows;</p> <p>(1) On November 10, 2016 at about 13:15 JST (Japan Standard Time: UTC+9 hrs.), a Boeing 767-300, registered JA658J, operated by Japan Airlines Co., Ltd, took off from Kagoshima Airport to Tokyo International Airport as the scheduled flight 646 of the company.</p> <p>In a cockpit, the PIC sat in the left seat as PM*1 and the FO sat in the right seat as PF*1.</p> <p>(2) Prior to the departure, the PIC let the FO explain to the cabin attendants that, with due consideration to effects of the cloud moving to the departure route from west and predictable changes of wind during the climb, the shake was expected for 10 to 15 minutes after takeoff, and the seat belt sign should be turned on for 15 minutes after takeoff.</p> <p>After the takeoff, an onboard weather radar did not show any significant echo of clouds, however, as at an altitude of about 10,000 to 13,000 ft, the Aircraft experienced the shake with the strength of weak to moderate, the PIC reported this information to Fukuoka Area Control Center.</p> <p>(3) The FO as PF set the speed of the autopilot to 290 kt as a turbulent air penetration target speed, since rather strong shakes started as entering a thin cloud from an altitude of about 10,000 ft.</p> <p>Then, after the shake got weaker at an altitude of about 14,000 ft and the Aircraft was on top of clouds, since the shakes of the Aircraft calmed at an altitude of about 20,000 ft, the FO set the speed of the autopilot to 310 kt as a normal climb speed and turned off the seat belt sign at an altitude of about 22,000 ft when the turn to the next course was completed.</p> <p>(4) The CA who sat in a seat for a cabin attendant (hereinafter referred to as “jump seat”) at the side of rear and left of the cabin checked the arm watch for three minutes passed from the takeoff, then because when the CA thought three more minutes (about six minutes after the takeoff) passed during the period of illuminating the seat belt sign on and found an infant crawling out of the hands of custodian to the vacant next seat, the CA called out loudly for the custodian. However, the situation did not improved, as the CA decided that it could be</p>
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*1 PF (Pilot Flying) and PM (Pilot Monitoring) are terms used to identify pilots by their different roles in aircraft controlled by two persons. The PF is mainly responsible for maneuvering the aircraft. The PM mainly monitors the flight status of the aircraft, cross-checks operations by the PF, and undertakes other non-operational work.

dangerous if the situation stayed as it was and the shake was not so strong at the time, the CA attempted to stand up and call out again with unfastening the seat belt and holding on the right shoulder harness. At that time, the CA felt the Aircraft was tilted to the right and had strong shakes at the same time, and the CA fell backward to the right side floor of the jump seat with a feeling of slight float of her body. The CA stood up from there and returned to her jump seat. As the seat belt sign was turned off after some time, then, the CA left her jump seat and reported the situation of the fall to the chief cabin attendant after the CA confirmed the infant secured. After that, because the CA felt a pain at the bruised portion, the CA sat in a rear jump seat and took a charge of announcement services.

After the arrival at the Tokyo International Airport, her injury was diagnosed as a bone fracture at a hospital.

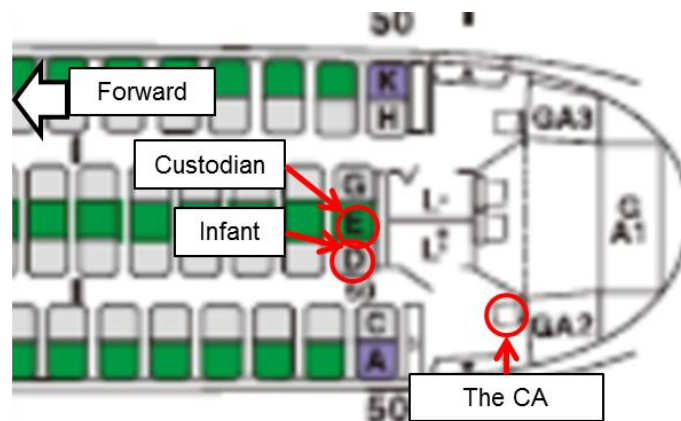


Fig 1 Seating diagram of rear cabin

(5) According to the records of the flight data recorder as shown in Figure 2, the short cycle vertical acceleration which was indicated by the red broken lined frame started to change after the takeoff of the Aircraft and the change was increasing from the time at an altitude of about 11,000 ft after three minutes 27 seconds from the takeoff to the time at altitude of about 13,000 ft after four minutes 15 seconds from the takeoff. This change of the short cycle vertical acceleration calmed once at 13:19:15 which was about four minutes 15 seconds from the takeoff, however, 77 seconds after that time, as indicated by the red circle, it began to increase again from at around 13:20:32, and the vertical acceleration was changed from +1.11 to +0.83 then it stopped at around 13:20:50.

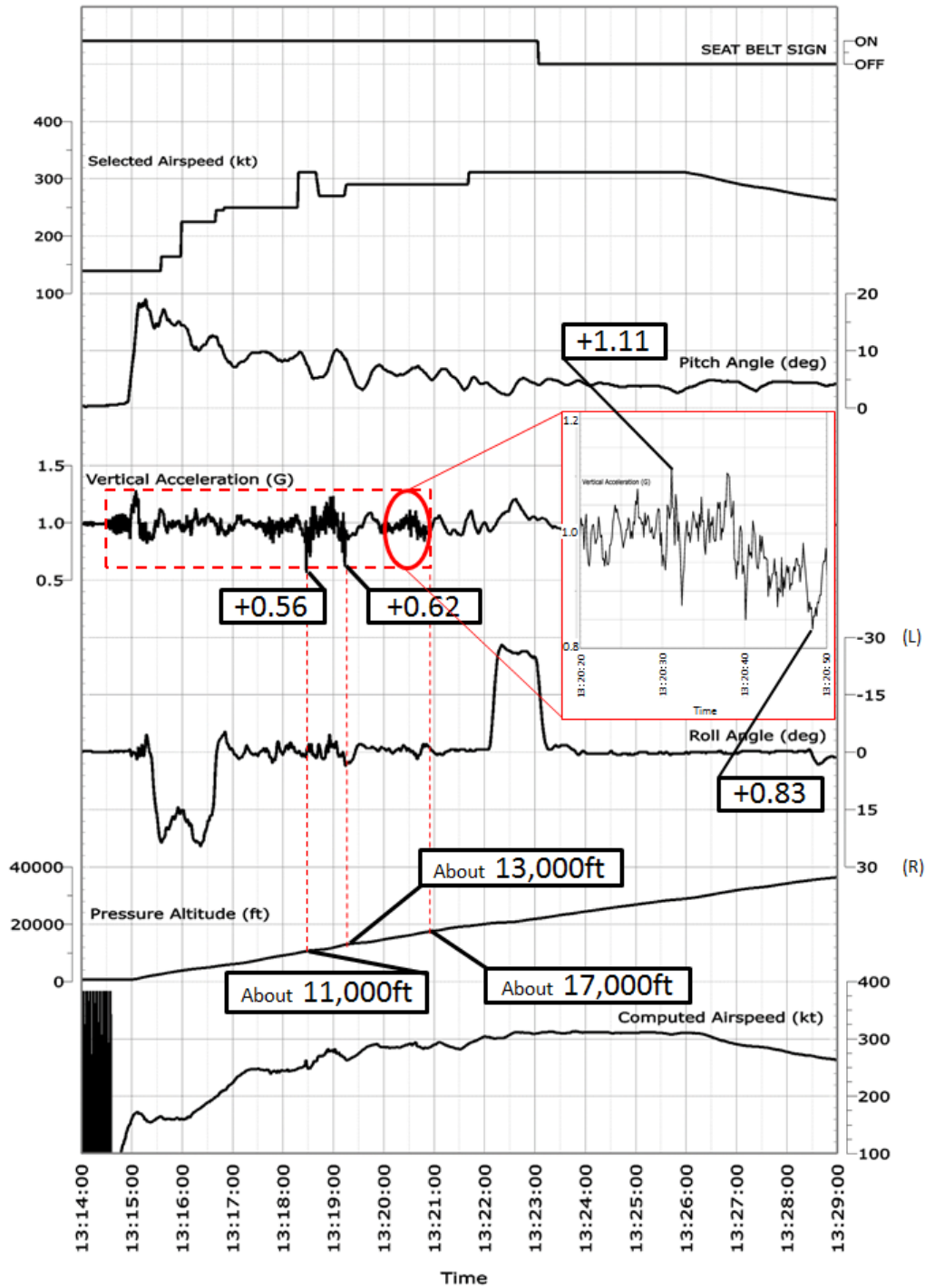


Fig 2 Records of flight data recorder

The estimated flight route of the Aircraft based on the records of the flight data recorder are as shown in Fig 3.

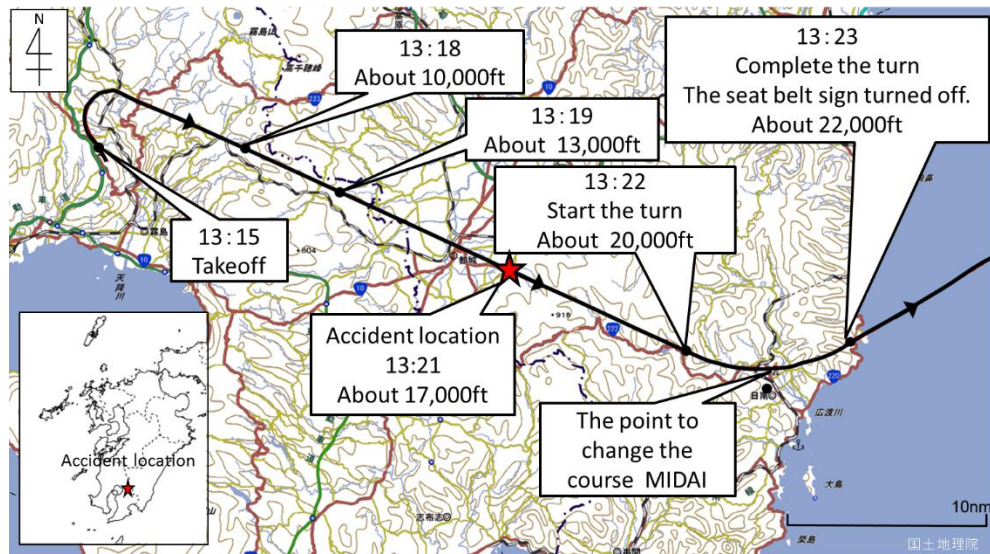


Fig 3 Estimated flight route

The accident occurred at about 13:21, on November 10, 2016, about 21 nm east-southeast of Kagoshima Airport (31°42'21" N, 131°07'07" E), at an altitude of about 17,000 ft.

2.2 Injuries to persons	The CA suffered a bone fracture, which was classified as a serious injury.
2.3 Damage to Aircraft	None
2.4 Personnel information, etc.	<p>(1) PIC Male, age 47 Airline transport pilot certificate (Airplane) December 20, 2005 Type rating for Boeing 767 January 13, 2005 Class 1 aviation medical certificate Valid until September 30, 2017 Total flight time: 11.747 hours 13 minutes Total flight time on the type of aircraft: 7,712 hours 27 minutes</p> <p>(2) FO Male, age 41 Commercial pilot Certificate (Airplane) August 17, 2000 Type rating for Boeing 767 February 18, 2002 Instrument flight certificate (Airplane) March 22, 2001 Class 1 aviation medical certificate Valid until November 7, 2017 Total flight time: 9.340 hours 35 minutes Total flight time on the type of aircraft: 8,856 hours 51 minutes</p>

<p>2.5 Aircraft information</p>	<p>(1) Aircraft type: Boeing 767-300 Serial number: 40370, Date of manufacture: October 24, 2011 Certificate of airworthiness: No. 2011-031 Category of airworthiness: Airplane Transport T Total flight time 11,894 hours 44 minutes</p> <p>(2) At the time of accident, the weight and the balance of the Aircraft was within the allowable range.</p>
<p>2.6 Meteorological information</p>	<p>(1) Routine aviation weather observation of the airport at 13:00 Wind direction 100° variable (from 080° to 140°), Wind velocity 11 kt; Prevailing visibility 10 km and more Cloud: Amount 1/8, Type Stratus, Cloud base 1,000 ft Amount 3/8, Type Stratocumulus, Cloud base 4,000 ft Amount 5/8, Type Stratocumulus, Cloud base 5,000 ft Temperature 12 °C; Dew point 10 °C Altimeter setting (QNH) 30.06 inHg</p> <p>(2) Upper wind conditions According to the Hourly Atmosphere Analysis Chart at 13:00, at the zone of altitude near the accident which is indicated in red circle, the wind shear as a vertical discontinuity of the wind velocity was about 6 kt per 1,000 ft which is relatively weak and there was no sign of a pronounced wind shear area.</p> <div data-bbox="523 1227 1294 1960" data-label="Figure"> <p>The figure is an hourly atmosphere analysis chart titled 'ANALYSIS 16/11/10 0400UTC (1300JST)'. The vertical axis represents altitude in feet (FL) from 50 to 450. The horizontal axis shows three stations: JFK, SUC, and KEC. Wind vectors are plotted at various altitudes, with a legend indicating speeds of 5kt, 10kt, and 50kt. Wind shear (WWS) is shown in a color-coded scale from 6 to 24 kt/1000ft. A red circle highlights a vertical discontinuity in the wind vectors between 210 and 225 feet altitude, indicating a wind shear area. The chart also shows pressure surfaces (isobars) and other atmospheric features.</p> </div> <p>Fig 4 Hourly atmosphere analysis chart</p>

	<p>(3) Height of top of cloud</p> <p>According to the rapid scan satellite imagery during the time zone of the accident, the height of top of cloud was about 18,000 ft around the accident location.</p>
<p>2.7 Additional information</p>	<p>“Operations Manual” of the company contains the following descriptions (excerpt);</p> <p><i>9-2-3 Seat belt, shoulder harnesses</i></p> <p><i>2. Cabin attendant</i></p> <p><i>(4) In case of an occurrences while the seat belt sign is turned on, jugged as causing possible serious damage to the passengers or aircraft unless quick action is taken, Cabin attendant may leave his/her seat and take action with his/her own judgment. In this case, Cabin attendant shall quickly be seated and fasten his/her seat belt after taking the necessary action.</i></p> <div data-bbox="596 875 1066 1464" data-label="Image"> </div> <p style="text-align: center;">Photo Jump seat</p>

3. ANALYSIS

<p>3.1 Involvement of weather</p>	<p>Yes.</p>
<p>3.2 Involvement of pilot</p>	<p>None</p>
<p>3.3 Involvement of equipment</p>	<p>None</p>
<p>3.4 Analysis of known items</p>	<p>(1) Shake of the Aircraft by Turbulence</p> <p>During the time from right after the takeoff to the point at altitude of about 17,000 ft, it is probable that the short cycle vertical acceleration which</p>

was recorded in the flight data recorder was caused by the shake of the aircraft due to the turbulence generated around the Stratocumulus.

The CA stated that she found the infant crawling out of the hands of the custodian to the vacant next seat at around six minutes after the takeoff when the shaking was calmed, however, it is probable that it was occurred while the change of vertical acceleration was calmed once at around the time after four minutes and 15 seconds from the takeoff which was recorded in the flight data recorder, to the time when the change of vertical acceleration began to increase at 5 minutes 32 seconds (13:20:32).

The increased change of the vertical acceleration which continued till five minutes and 50 seconds (13:20:50) after the takeoff and it is somewhat likely that the CA attempted to stand up at around this time.

According to the Hourly Atmosphere Analysis Chart and the statement of the FO, after the turbulence caused by the cloud calmed down, it is probable that the shake of the Aircraft resulted from a weather phenomenon called the clear air turbulence or others were not observed.

(2) The CA judgment and situation of her fall

During the takeoff climbing at the time of the seat belt signs to be turned on, the CA found the infant crawling out of the hands of the custodian to the vacant next seat and called out to for the custodian's attentions loudly, but it is highly probable that the situation of the infant was not improved. It is probable that the CA judged that the infant would suffer the serious consequence unless taking appropriate action, so as an urgent correspondence, when she tried to stand up in order to be closer to call out and unfastened her seat belt, she lost balance, fell backward to the floor at right of the jump seat and suffered the injury.

It is somewhat likely that the CA lost balance, because the shake of the Aircraft increased its strength again due to the turbulence when the CA tried to stand up.

4. PROBABLE CAUSES

In this accident, it is probable that the CA suffered the injury, because during the takeoff climbing at the time of the seat belt signs to be turned on, as the CA found an infant crawled out of the hands of the custodian to the vacant next seat and attempted to stand up in order to call out, lost balance, fell backward to the floor at right of the jump seat.

It is somewhat likely that the CA lost balance, because the shake of the Aircraft increased its strength again due to the turbulence when the CA tried to stand up.

5. SAFETY ACTION

The company have taken the following action to prevent reoccurrences;

(1) Make sure for the relevant parties to know the outline and the following actions of the accident with the Cabin Safety Information as public knowledge.

- ① Caution for leaving the seat of cabin attendant for urgent correspondence
 - Depending on situation, consider an in-flight announcement prior to leaving a seat.
 - At the time of leaving a seat, secure the hold onto the aircraft structural frame for restraining owned body as being aware of the turbulence.
- ② Greeting guidelines to a custodian of infant prior to takeoff
 - Inform a custodian to make sure to hold an infant securely, while the seat belt sign is turned on.
- ③ Announcement guideline regarding the infant-protection while the seat belt sign is turned on
 - Add the contents to specify the secure hold of infant while the seat belt sign is turned on into the announcement guidelines to announce to wear a seat belt on.
- ④ Handling procedure for the time of injuries to a cabin attendant
 - Promptly report to the PIC regardless of severities of the injuries.
 - Change a cabin attendant role in case of an emergency as required under the PIC's confirmation.

(2) Reflected the announcement guidelines regarding the protection of infant while the seat belt sign is turned on into the cabin attendant manual.

(3) Start to publish the protection guidelines in in-flight magazine in order to let passengers understand the infant-protection guidelines while the seat belt sign is turned on.